clination of the originally level shores of these lakes.

The latest completed geologic period, when an ice sheet covered the northern half of our continent, is being very satisfactorily investigated, both in the United States and Canada. As in an earlier monograph of this series, on the glacial Lake Agassiz, it will be an advantage to the geological surveys of each country that these detailed explorations about the Great Lakes be extended to give such full description and discussion of the ancient larger lake areas, with their shore lines and relations to the waning ice sheet, on both sides of the international boundary.

Warren Upham.

SCIENTIFIC JOURNALS AND ARTICLES.

Bird Lore for November–December contains articles 'On Journal Keeping,' by Ernest Thompson Seton; 'Flamingoes' Nests,' illustrated, by Frank M. Chapman; 'The Weapons of Birds,' by F. A. Lucas; and 'Whiskey John in Colorado,' by E. R. Warren. The seventh paper on 'How to Name the Birds' is devoted to the Sylviidæ and Turdidæ and the first paper on 'How to Study Birds' are both by Frank M. Chapman. There is the first of a series of portraits of *Bird Lore's* advisory councilors depicting Messrs. William Dutcher, T. Gilbert Pearson, Lynds Jones and C. W. Nelson, and the usual notes, reviews and reports of societies.

The Museums Journal of Great Britain for November has an article on museum matters presented at the Belfast meeting of the British Association, and description of a dust-proof air inlet for museum cases, a feature entirely too much neglected in the construction of cases. F. A. Bather discusses 'Names on the Labels in Public Galleries,' in which he touches on the difficulties of providing so-called common names for objects and intimates that scientific names are much more generally understood than is often supposed. This article should be widely read. There is an interesting series of notes concerning museums in various parts of the world.

The *American Museum Journal* for December gives a summarized account of the proceedings of the Thirteenth International Congress of Americanists, a review of the recent work of the museum, and a list of the December lectures. The number contains the index for Volume II.

The Plant World for October contains 'Extracts from the Note Book of a Naturalist on the Island of Guam,' by W. E. Safford; 'A Study of the Island Flora of the Mississippi River near Sabula, Iowa,' by T. J. and M. F. L. Fitzpatrick, and the second article on the 'Origin of Plant Names,' by Grace S. Niles. Among the shorter articles are the official announcements of the Wild Flower Preservation Society.

SOCIETIES AND ACADEMIES.

PHILOSOPHICAL SOCIETY OF WASHINGTON.

The 558th regular meeting was held November 22, 1902.

Dr. H. Carrington Bolton presented a paper on 'Science and Art under Rudolph II., 1570–1612,' narrating many of his experiences with the astrologers and charlatans that he patronized so liberally, and pointing out the important results that followed his support of Tycho Brahe and Kepler.

Dr. A. F. A. King read 'Further Remarks on Sunlight, Malaria and Scoto-therapy,' in which he reviewed his former paper (see Science, December 27, 1901, p. 1007), and in support of the blue fluorescence of quinine being its curative property, cited the facts that *esculin* and *fraxin* were also fluorescent and curative like quinine. The curative power of iodine was due to its producing the *violet* iodide of starch in the stomach.

Dr. King recommended blue- or violet-colored clothing for armies in malarious regions, and purple tents instead of the white canvas now used. He suggested several experiments in scoto-therapy—keeping some patients in the dark or in rooms with purple or indigo window glass, and exposing others, nude, to brilliant sunshine—which were inexpensive and easily accomplished, and which, he hoped, those having opportunities would try, in order

to test the power of sunlight in promoting sporulation of malarial parasites in the blood.

Dr. Peter Fireman then spoke on the 'Deduction of the Magnitude of Osmotic Pressure according to the Kinetic Theory.' He held, first, that the mean kinetic energy of the molecules of a dissolved substance is the same as that of a gas at the same temperature; and, second, that the number of impacts of the molecules of a dissolved substance per unit of time on unit area of any imaginary plane in the solution is the same as if the dissolved substance were in the gaseous state and confined in the same volume at the same temperature. Therefore, the laws governing osmotic pressure in solutions are identical with the laws of perfect gases, and follow directly from the kinetic theory.

THE 559th meeting was held December 6, 1902.

Announcement was made of the death of Mr. Henry Mitchell, a distinguished engineer, and of Mr. J. W. Osborne, a distinguished inventor in the art of photolithography, both members of the society.

Professor Newcomb gave a brief account of his visit to Christiania during the past summer to attend the convention of mathematicians held in commemoration of the one-hundredth anniversary of Abel's birth.

The first regular paper was by Dr. C. D. Walcott on 'The Development of the Carnegie Institution.' He pointed out how its location in Washington is a case of natural development, tracing the growth of scientific organization in the city from the early days when this society stood alone, through the times when societies were multiplied, then through the unifying period of the Joint Committee and the Academy of Sciences, out of which came the Washington Memorial Association; by this last-named body plans for research were formulated clearly enough to attract Mr. Carnegie's attention. His $10,000,000 endowment of the new institution is familiar to all. The trustees of this body appointed 16 advisory committees, including 46 members; their reports on projects submitted to them, filling over 200 printed pages, were presented confidentially to the trustees at their recent meeting, together with other reports; portions of these will be made public early next year. Statements were made regarding the principles adopted for making grants, both of exclusion and of inclusion; special emphasis is laid on the selection of the man who is to be responsible for any specific research, since vague or general appropriations are not favored.

Dr. H. W. Wiley, of the Department of Agriculture, in view of the popular interest in his diet investigations, discussed 'How to Test the Harmfulness of Food Preservatives,' if they are harmful, as alleged. He called attention to the enormous industrial importance of the subject, the difficulty of obtaining reliable data, and the danger of complications with foreign countries over our food exports. The older methods of preservation were: Desiccation, resulting in a tasteless product; sterilization by heat, often imperfect, and cold storage. The cold storage plants of the country are worth $100,000,000 and contain constantly food supplies of an equal value. Cheapest of all methods is the use of chemicals. The effect of these may be tested, chemically by artificial digestion, by experiments on the lower animals, or by experiments on man. Under an appropriation from Congress the speaker is beginning experiments on twelve volunteers, whose food supply and excreta will be fully analyzed to determine the effect, if any, of the usual preservatives. Various details of the direct and the control experiments were given.

CHARLES K. WEAD,
Secretary.

GEOLOGICAL SOCIETY OF WASHINGTON.

THE 134th meeting was held December 10, 1902. The following papers were presented:

'A Carboniferous Section in the Upper Copper River Valley, Alaska,' by W. C. Mendenhall.

Mr. Mendenhall presented some of the details of a section of 7,000 or 8,000 feet of Upper Carboniferous strata, measured during the past summer among the foothills of the Alaskan Range, in the northern part of the

Copper River basin. The paper closed with a summary of the known Alaskan occurrences of the Carboniferous.

'Occurrence of Paleozoic Rocks in the Southern Portion of the Great Basin Region,' by F. B. Weeks.

Mr. Weeks said in part, the Paleozoic sedimentary series in this region extends from the Pre-Cambrian to the Permian, or possibly the Trias. The granites and allied rocks of the Grand Canyon section, and of southeastern California extending into the Sierra Nevada, comprise the basement complex. The Pre-Cambrian consists of quartzites and schists of undetermined thickness. These are conformably overlain by the Cambrian strata of alternating beds of quartzite, shale and limestone, which attain a thickness of 10,000 feet or more. The Silurian is represented by two great masses of limestone with several hundred feet of quartzite between them. The series is very similar to that described by Hague at Eureka, and the important unconformity between the quartzite and the overlying limestone noted at Eureka also occurs in the Panamint and Grapevine ranges. The Devonian limestone is exposed in the ranges directly east of the Grapevine range, and also forms a considerable portion of the Desert range. The Carboniferous limestones are exposed in the Inyo and Darwin ranges and form a large part of the Charleston mountains. The section in the latter range consists of Lower Carboniferous limestones, red sandstones and shales and an Upper Carboniferous limestone. Above these are other limestones containing a Permian or possibly a Triassic fauna. The data relating to the Charleston range were obtained by R. B. Rowe, who was engaged in a study of the geology of this region for some months prior to his death in 1902. Between the Cambrian and the Ordovician in the Great Basin region there appears to be heavy faulting in some sections, and in others a thrusting of the Ordovician upon the underlying Cambrian beds. Prior to the Carboniferous there was an erosion interval and an overlapping of the Carboniferous upon the Devonian and probably the Silurian. King's conclusion that there are 40,000 feet of conformable Paleozoic strata in the Great Basin region has not been confirmed by recent studies. The structure of the Basin ranges is believed to be the result of crustal movements of uplift and subsidence accompanied by faulting, thrusting and erosion at different stages of Paleozoic time, orographic forms having been modified by erosion and subsequent earth movements during the long interval from the Permian to the present.

'The Horseheads Outlet of the Glacial Lakes of Central New York,' by M. L. Fuller.

Mr. Fuller described the nearly uniform maximum altitude attained by the crests of the drift deposits of the valleys both to the north and to the west of Horseheads, and classed them with morainal terraces rather than with true moraines. The uniform altitude, together with the presence at several points of notches cut to approximately the same level across the projecting rock points by streams flowing along the sides of the ice tongues occupying the lower portion of the valleys, was considered as evidence of a local body of standing water reaching to a height of about 100 feet above the present streams at Horseheads. The terraced character of the outlet at Horseheads was also described, and the opinion expressed that the broader terrace is an erosional and not a constructional (flood-plain) feature, and that it represents the outlet of Lake Newberry at its principal stage. The lower and smaller channel, which is narrower than many of the channels cut by the small streams now existing, is considered as marking the final stage of the outlet when part of the escaping waters of the lake were, as the ice retreated, beginning to escape at other outlets located, it seems most probable, at a point some distance to the east.

Alfred H. Brooks,
Secretary.

TORREY BOTANICAL CLUB.

At a meeting of the club on November 11, 1902, the scientific program consisted of a paper by Dr. L. M. Underwood on 'The Gold and Silver Ferns.' Dr. Underwood said that characters based upon position and form of

sori and indusia have perhaps been emphasized too much in classification; in some species the indusium may be developed or may be wanting on the same plant. There is now a tendency to return to the recognition of the fibro-vascular system as an element in classifying ferns. Mainly free-veined ferns occur in Devonian and Carboniferous remains. Anastomosing veins seem to have developed later; and even now they form the predominant feature in but two of the ferns of our northern states, *Onoclea sensibilis* and *Woodwardia areolata*. The pinnate and flabellate types of venation are very distinct, but are connected in appearance by a modification of the last type with successive alternation of its dichotomy forming a prolonged axis. The ferns known as gold and silver ferns were included in 1811 in the genus *Gymnogramme*. Some twenty genera have since been segregated from it, some of them on insufficient grounds. Many garden hybrids and horticultural varieties have been developed. With the exception of a species in Madagascar, the group is confined to the tropics of America, where the species known as the silver fern is perhaps the most common fern known. The goldenback fern of California is perhaps most familiar to ordinary knowledge; its range is from Alaska to Lower California, but not eastward of the Sierras. In life it is of a bright golden yellow beneath (often replaced by silvery powder), a brilliant green above; in the dry season it coils up involutely, exposing only the under surface, which is covered by its peculiar golden waxy powder.

This and other ferns of the arid region prevent too great transpiration of water by developing waxy or resinous powders, or by layers of wool or of scales. A Mexican species, *Notholæna aurantiaca*, was exhibited, which combines two protections, powder and scales. The silver fern of our arid Southwest finally becomes almost chalky beneath; it becomes coiled almost into a ball in the dry season.

Discussion followed upon the true interpretation of the function of the waxy powder. Dr. C. C. Curtis deemed it to accomplish two purposes, that of plugging stomata and that of reflecting heat. Dr. Rusby recalled the suggestion made by Mr. Chas. F. Cox some years ago, to the effect that plant hairs carry on metabolism and aid nutrition.

Dr. Rusby also described the appearance and habitats of several species which he had been familiar with in Bolivia and in our own Southwest; in the Rockies, where *Notholæna* and *Cheilanthes* grow together from the same crevices of rock, they respond to rain with remarkable quickness. In the dry season when everything else is seemingly dead, if a rain should occur, their coiled fronds quickly become bright green and well expanded, though curled again into little balls in a few days if dry weather follows.

EDWARD S. BURGESS,
Secretary.

NORTH CAROLINA SECTION OF THE AMERICAN CHEMICAL SOCIETY.

THE North Carolina Section held its fall meeting in the Office of State Chemist, Agricultural Building, Raleigh, N. C., on Saturday, November 22, 1902, with presiding officer Charles E. Brewer in the chair. Twenty members and visitors were in attendance. Hereafter all papers presented at the meetings will be required to be in abstract. Drs. A. S. Wheeler and G. S. Fraps were elected reviewers for the Section for the ensuing year. Their duties will be for each to prepare and present at some meeting during the year a paper giving briefly the advances recently made in some branch of chemistry. This departure promises to be a valuable addition to the programs. The following papers were presented and discussed:

'Some New Double Sulphates of Lanthanum, and on the Existence of Lanthanum Alums,' by Charles Baskerville and E. G. Moss.

'Lanthanates,' by Chas. Baskerville and G. F. Catlett.

The resemblance of lanthanum to aluminum was taken advantage of and the preparation of such bodies as the lanthanates and meta-lanthanates hitherto not reported, described. The new substances are sodium lanthanate ($NaLaO_2$) and meta-lanthanates of sodium,

potassium, lithium and barium ($M'H_9La_5O_{15}$). Two methods were used—fusion of lanthanum oxide with alkaline carbonates, and prolonged digestion in a very concentrated solution of the alkaline hydroxides at 100° C.

'Studies in Nitrification,' by G. S. Fraps.

The nitrification of ammonium sulphate or cotton-seed meal in a soil under constant conditions is periodic, reaching a maximum and then decreasing, due probably to the variation in the activity of the nitrifying organisms at different times. A sterilized soil, inoculated with different nitrifying soils, nitrifies cotton-seed meal and ammonium sulphate in different ratios, according to the soil used for inoculation, due to difference in the nitrifying organisms. A method is given for comparing the nitrifying power of two or more soils.

'Improved Method for Halogen Determinations in Atomic Weight Work,' by Chas. Baskerville and R. O. E. Davis.

The method reported was devised in the progress of the work on the redetermination of the atomic weight of thorium. The numerous precautions for the determination of chlorine were rehearsed, and attention directed to the deliquescence of thorium tetrachloride and the difficulty incident to complete elimination of chlorine from the dioxidein obtaining the ratio between the halogen and oxygen compounds of that heavy metal. A series of twenty-five preliminary determinations was made of the solubility of silver chloride in pure alcohol, alcoholic solution of silver nitrate, and nitric acid of variable strengths at different temperatures with a time variant. All reagents were the so-called chemically pure.

Elevation of temperature (50° C. and above), excess silver nitrate (more than twenty per cent.), marked acidity (over three per cent.) and prolongation of time of reaction (fifteen minutes) were determined as factors causing a result too high by from .7 to 4.3 per cent. (in exaggerated cases) when a standard sodium-chloride solution was precipitated by a standard silver nitrate. This was due to the formation of aldehyde from oxidation of the alcohol by the nitric acid and silver nitrate, with consequent precipitation of metallic silver with the silver chloride. Experimental proof of this was given.

A new series of six determinations, where all reagents were repurified, silver nitrate being made from metal prepared by the method of Stas, was carried out. Results were obtained giving an error of from zero to .098 per cent., hence it appears that the halogen may be determined accurately when an excess of silver nitrate is used (even to ten per cent.) the solution is slightly acid (nitric), the precipitation being caused at ordinary temperatures with vigorous stirring for five minutes in ethyl alcohol. Proper precautions as to purification of asbestos, using counterpoise crucibles, dark chamber for precipitation and filtration, dark bath for drying, etc.

The use of alcohol appears to be new.

'Chlorides in Tobacco,' by W. H. Pegram. The work set forth in this paper was designed and is being prosecuted for the purpose of ascertaining whether there is a relation between the chlorides in tobacco and the chlorides in the fertilizer used in its production; also whether a high percentage of chlorides (as calcium and magnesium chlorides) affects the hygroscopic property of tobacco, giving abnormal and damaging results at certain stages of its preparation and manufacture. The data are insufficient as yet to justify a valid conclusion.

'Suggested Changes in the Law of Dulong and Petit,' by J. E. Mills. Abstract has appeared in the proceedings of the Elisha Mitchell Scientific Society. (See Science, N. S. Vol. XVI., No. 414, p. 907.)

'Neodymates,' by Charles Baskerville and W. O. Heard.

The following methods were used in efforts to prepare neodymates: Fusion with alkaline carbonates, alkaline earth carbonates and oxides, chlorides, digestion in concentrated alkaline hydroxide solutions, and fusion with sodium dioxide. Results not altogether satisfactory were obtained, with the surprising exception of a barium compound,

$$BaCO_3.Ba(NdO_2)_2.5H_2O.$$

'Artificial Plant Food Requirements of Soils,' by B. W. Kilgore. (See 'Proceedings of the Fifteenth Annual Convention of the Association of American Colleges and Experiment Stations,' pp. 73–75.)

'Methods for the Determination of Total Phosphoric Acid and Potash in Solids,' by C. B. Williams.

The method devised for the determination of total phosphoric acid in soils was simply, after igniting five grams of soil in a platinum dish, treat three times with hydrofluoric acid, evaporating to dryness each time, followed by fusion with ten grams of a mixture of equal parts of sodium and potassium carbonate. The cake thus obtained, after cooling, was transferred to a beaker and digested with about 30 to 40 c.c. (1 to 1) hydrochloric acid, after which the solution was evaporated to dryness on a water-bath, being subsequently heated four or five hours in an air-bath, to 110° C. to dehydrate the silica present. It was then taken up with dilute hydrochloric acid, filtered and washed. The filtrate and washings thus obtained, after adding sufficient nitric acid to liberate all hydrochloric acid present, are placed together and reduced to a volume of about 40 c.c. by boiling. The excess of nitric acid is then neutralized with ammonia, and ten to twelve grams ammonium nitrate is added. After cooling, 30 c.c. recently filtered molybdic solution is added and the phosphoric acid is precipitated by shaking in a Wagner machine, and determined volumetrically (*Jour. Am. Chem. Sc.*, Vol. 23, No. 1, pp. 8–12).

Total potash is brought into solution by treating four grams of soil in a platinum dish on water-bath, after saturating with dilute (1 to 1) sulphuric acid and igniting, with from 2 to 3 c.c. hydrofluoric acid for five times, adding 1 c.c. dilute (1 to 1) sulphuric acid just before going to dryness the last time. After the last traces of hydrofluoric acid have been liberated the dish is removed from water-bath and heated gently over small flame until evolution of sulphur trioxide ceases. The soil is then taken up with 20 c.c. distilled water slightly acidified with hydrochloric acid, and digested on water-bath until the solution has been reduced to about one third of its orginal volume, after which it is transferred to a 200-c.c. graduated flask and heated on water-bath to near boiling, when ammonia and ammonium oxalate are added in sufficient quantity to precipitate all iron, alumina and lime present. After cooling, the volume is made up to 200 c.c., and an aliquot corresponding to two grams is filtered off into a porcelain dish. From this point on the procedure is the same as that prescribed in the regular Lindo-Gladding method.

There being no further business, the section adjourned, subject to the call of the Executive Committee.

C. B. WILLIAMS.
Secretary.

DISCUSSION AND CORRESPONDENCE.

PRESIDENT SCHURMAN ON THE EDUCATIONAL REQUIREMENTS FOR PROFESSIONAL STUDY.

TO THE EDITOR OF SCIENCE: In the issue of SCIENCE of November 21, on page 816, is published an excerpt from the annual report of President Schurman of Cornell University, containing statements bearing upon the question of collegiate work as a requirement for admission to professional schools. It is not my function to discuss or criticize the policy of the President of Cornell University. The report, however, contains several statements upon which comment seems necessary.

"At Cornell University at any rate [runs the report] the established policy is to admit students to any course who are able to pass the examinations qualifying them to pursue that course. And such preliminary tests, it is generally conceded by the members of the profession concerned, do not exceed the requirements for graduation at the best high schools."

I cannot speak for the lawyer, the engineer or the architect, but in the name of the profession of medicine I beg in the most respectful manner to protest. With the matter of culture-studies we need have no concern here. I believe it may be stated as an established fact that a proper education in modern